
The long noncoding RNA pnky regulates neuronal differentiation of embryonic and postnatal neural stem cells.

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Public Summary:

While thousands of long noncoding RNAs (lncRNAs) have been identified, few lncRNAs that control neural stem cell (NSC) behavior are known. Here, we identify Pinky (Pnky) as a neural-specific lncRNA that regulates neurogenesis from NSCs in the embryonic and postnatal brain. In postnatal NSCs, Pnky knockdown potentiates neuronal lineage commitment and expands the transit-amplifying cell population, increasing neuron production several-fold. Pnky is evolutionarily conserved and expressed in NSCs of the developing human brain. In the embryonic mouse cortex, Pnky knockdown increases neuronal differentiation and depletes the NSC population. Pnky interacts with the splicing regulator PTBP1, and PTBP1 knockdown also enhances neurogenesis. In NSCs, Pnky and PTBP1 regulate the expression and alternative splicing of a core set of transcripts that relates to the cellular phenotype. These data thus unveil Pnky as a conserved lncRNA that interacts with a key RNA processing factor and regulates neurogenesis from embryonic and postnatal NSC populations.

Scientific Abstract:

While thousands of long noncoding RNAs (lncRNAs) have been identified, few lncRNAs that control neural stem cell (NSC) behavior are known. Here, we identify Pinky (Pnky) as a neural-specific lncRNA that regulates neurogenesis from NSCs in the embryonic and postnatal brain. In postnatal NSCs, Pnky knockdown potentiates neuronal lineage commitment and expands the transit-amplifying cell population, increasing neuron production several-fold. Pnky is evolutionarily conserved and expressed in NSCs of the developing human brain. In the embryonic mouse cortex, Pnky knockdown increases neuronal differentiation and depletes the NSC population. Pnky interacts with the splicing regulator PTBP1, and PTBP1 knockdown also enhances neurogenesis. In NSCs, Pnky and PTBP1 regulate the expression and alternative splicing of a core set of transcripts that relates to the cellular phenotype. These data thus unveil Pnky as a conserved lncRNA that interacts with a key RNA processing factor and regulates neurogenesis from embryonic and postnatal NSC populations.

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